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Triple trouble: uncovering the risks and benefits of early fetal reduction in trichorionic triplets in a large national Danish cohort study

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BACKGROUND: Triplet pregnancies are high risk for both the mother and the infants. The risks for infants include premature birth, low birthweight, and neonatal complications. Therefore, the management of triplet pregnancies involves close monitoring and may include interventions, such as fetal reduction, to prolong the pregnancy and improve outcomes. However, the evidence of benefits and risks associated with fetal reduction is inconsistent.

OBJECTIVE: This study aimed to compare the outcomes of trichorionic triplet pregnancies with and without fetal reduction and with nonreduced dichorionic twin pregnancies and primary singleton pregnancies.

STUDY DESIGN: All trichorionic triplet pregnancies in Denmark, including those with fetal reduction, were identified between 2008 and 2018. In Denmark, all couples expecting triplets are informed about and offered fetal reduction. Pregnancies with viable fetuses at the first-trimester ultrasound scan and pregnancies not terminated were included. Adverse pregnancy outcome was defined as a composite of miscarriage before 24 weeks of gestation, stillbirth at 24 weeks of gestation, or intrauterine fetal death of 1 or 2 fetuses.

RESULTS: The study cohort was composed of 317 trichorionic triplet pregnancies, of which 70.0% of pregnancies underwent fetal reduction to a twin pregnancy, 2.2% of pregnancies were reduced to singleton pregnancies, and 27.8% of pregnancies were not reduced. Nonreduced triplet pregnancies had high risks of adverse pregnancy outcomes (28.4%), which was significantly lower in triplets reduced to twins (9.0%; difference, 19.4%, 95% confidence interval, 8.5%—30.3%). Severe preterm deliveries were significantly higher in nonreduced triplet pregnancies (27.9%) than triplet pregnancies reduced to twin pregnancies (13.1%; difference, 14.9%, 95% confidence interval, 7.9%—21.9%). However, triplet pregnancies reduced to twin pregnancies had an insignificantly higher risk of miscarriage (6.8%) than nonreduced twin pregnancies (1.1%; difference, 5.6%; 95% confidence interval, 0.9%—10.4%).

CONCLUSION: Triplet pregnancies reduced to twin pregnancies had significantly lower risks of adverse pregnancy outcomes, severe preterm deliveries, and low birthweight than nonreduced triplet pregnancies. However, triplet pregnancies reduced to twin pregnancies were potentially associated with a 5.6% increased risk of miscarriage.

Key words: adverse pregnancy outcome, chance of live born, Danish national cohort, embryo reduction, multifetal pregnancy, multifetal pregnancy reduction, multiples, pregnancy complications, preterm birth, preterm delivery, reproductive autonomy, selective termination

Introduction

Pregnancies with more than 1 fetus are at increased risk of miscarriage, stillbirth, intrauterine and perinatal fetal death of one or more fetuses, preterm delivery, and low birthweight.[1–4] The risks are closely related to the number of fetuses and the chorionicity of the multifetal pregnancy (MFP).[5]

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Triplet and higher-order MFPs were reported to account for 10.3 per 10,000 pregnancies in the United States by 2015.[6] In Denmark, triplet deliveries accounted for 1.74 per 10,000 of all deliveries by 2015 but dropped to 0.49 per 10,000 deliveries in 2018.[7] Over the last 3 decades, triplet pregnancies became more frequent with the increased use of assisted reproductive technology (ART).[6,8] However, the increase has reached a plateau as most countries have introduced guidelines on the use of ART.[2,9]

Fetal reduction (FR) was first described by Åberg et al[10] in 1978 for treating a twin pregnancy discordant with a fetal anomaly, and FR has subsequently been described in the literature as an option for improving the outcome of the remaining fetuses.[6,11] FR in triplet pregnancies have yielded results with large variation, indicating significant heterogeneity in previous studies, which could be attributable to population differences, selection bias, lack of suitable comparators, or even a reflection of advances in perinatal care over time.[11] To the best of our knowledge, only 1 previous study from the Netherlands has reported nationwide results of all trichorionic triamniotic (TCTA) triplet pregnancies.[12]

This study aimed to describe and compare pregnancy outcomes between (1) reduced and nonreduced TCTA triplet pregnancies and (2) reduced TCTA triplet pregnancies and appropriate comparators, either primary dichorionic diamniotic (DCDA) twin pregnancies or primary singleton pregnancies, in a Danish nationwide cohort of 11 years.

Materials and Methods

Study population and design

This was a retrospective cohort study of prospectively collected data from the national Danish Fetal Medicine Database (DFMD) over 11 years. The study was

AJOG at a Glance

Why was this study conducted?

Trichorionic triplet pregnancies present unique challenges for expectant mothers and their healthcare providers. The current evidence regarding triplets with or without fetal reduction (FR) is inconsistent and often suffers from selection bias and missing outcome data.

Key findings

FR from 3 to 2 fetuses lowers the risk of adverse pregnancy outcomes, preterm delivery, and low birthweight of the children, all of which are common in nonreduced triplet pregnancies and associated with increased risk of neonatal morbidity and mortality.

What does this add to what is known?

This study was a national study of all trichorionic triplet pregnancies with and without FR and compared the outcomes with all dichorionic twin pregnancies. Our findings emphasized the safety of performing FR in trichorionic triplets with a relatively low procedure-related risk of miscarriage.

conducted using the Strengthening the Reporting of Observational Studies in Epidemiology checklist.[13] In Denmark, all pregnant women are offered an 11- to 14-week ultrasound scan in the public healthcare system, with a participation rate that increased through the study period from 94% to 98%.[14] The assessment includes chorionicity determination in all MFP, and according to national guidelines, all women with triplet pregnancies or higher-order MFP are informed about and offered FR.

The DFMD serves as a registry of the Danish Clinical Quality Program for the antenatal screening program and research on Danish national data, and all obstetrical departments in Denmark are obliged to provide and validate data. All obstetrical departments in Denmark use Astraia (GmbH, Munich, Germany) to store data and images from ultrasound scans. Selected data regarding each pregnancy are transferred daily from the local servers to the DFMD, where the local data are linked with the Danish National Birth Register, the Danish National Patient Registry, and the Danish Cytogenetic Register, as previously described.[15,16]

Baseline characteristics and clinical data were obtained from the DFMD, and the local electronic medical files were reviewed in case of missing data. The national Danish guidelines recommend cesarean delivery at 36 weeks of gestation, or earlier in the case of pregnancy complications, for all nonreduced triplet (NR-T) pregnancies.

Inclusion and exclusion criteria

All TCTA triplet pregnancies with 3 viable fetuses at 11 to 14 weeks of gestation and a known pregnancy outcome were included. TCTA triplet pregnancies undergoing FR were identified in the DFMD and the local fetal medicine databases (Astraia) of the 4 university hospital departments performing FR in Denmark (Copenhagen University Hospital, Rigshospitalet; Copenhagen University Hospital, Hvidovre; Aalborg University Hospital; and Aarhus University Hospital, Skejby). To describe the background population and for comparison purposes, all DCDA twin pregnancies plus a large cohort of randomly selected singleton pregnancies with similar inclusion criteria (viable fetuses, known pregnancy outcome, and pregnancies not terminated), derived from the same national cohort and study period, were also included. The study period was between January 1, 2008, and December 31, 2018. Chorionicity was confirmed by the presence of separate placentae and a "lambda sign" of the intertwin membranes. Quantitative variables were assessed for consistency, and in the case of extreme outliers or doubts, a correction was made when supplemental information from electronic medical files was available, but otherwise, these were excluded from further analyses. We excluded MFPs with more than 3 fetuses, MFPs containing a monochorionic pair, and all cases of termination of pregnancy (Figure 1).

Fetal reduction

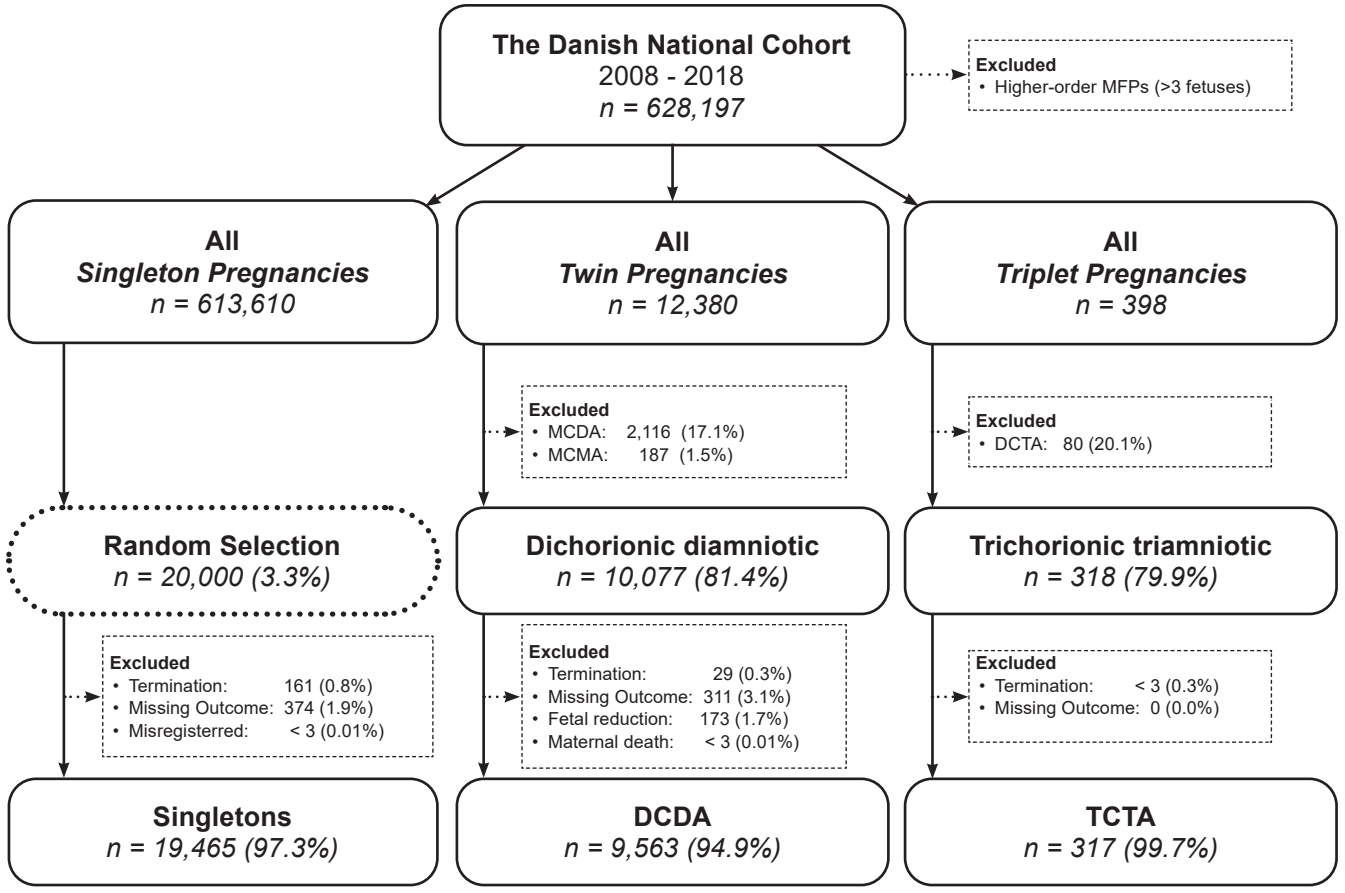
All women with triplet pregnancies or higher-order MFP are informed about and offered FR in Denmark, following national guidelines. Reduction to 2 fetuses or termination of the entire pregnancy is permitted without application until 11+6 weeks of gestation in Denmark. Beyond that, there is application to the Regional Abortion Counsel. Reduction of TCTA triplet pregnancies to singleton pregnancies is not permitted unless specific indications exist, such as discordant fetal structural or genetic anomalies or maternal medical conditions and other high-risk factors.

All FR procedures in Denmark follow the same protocol: using a transabdominal approach with a needle guide, 20 gauge needle, and intracardiac injection of a few milliliters of 2 mmol/mL potassium chloride to produce asystole. Prophylactic antibiotics were not routinely used. All procedures were performed by or under the supervision of fetal medicine consultants, all experienced in invasive prenatal diagnostic and therapeutic techniques. All women had an ultrasound examination shortly after FR and again 1 week later to demonstrate the viability of the remaining fetuses. TCTA triplet pregnancies reduced to twin pregnancies were subsequently managed as dichorionic twin pregnancies in their local obstetrical department, following the Danish national guidelines.

Outcome measures

The primary outcome measures were (1) adverse pregnancy outcome, defined as a composite of miscarriage before 24 weeks of gestation, stillbirth from 24 weeks of gestation, or single or double intrauterine fetal death (IUFD) in pregnancies with more than 1 fetus; (2) preterm delivery rates before 28, 32, or

FIGURE 1
Flowchart of study population with details of included and excluded pregnancies



DCDA, dichorionic diamniotic; *DCTA*, dichorionic triamniotic; *MCDA*, monochorionic diamniotic; *MCMA*, monochorionic monoamniotic; *MFP*, multifetal pregnancy; *TCTA*, trichorionic triamniotic.

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37 weeks of gestation; (3) birthweight in grams and *z* scores (adjusted for gender and gestational age [GA] at delivery) using the birthweight reference of Marsál et al,[17] recommended for singleton pregnancies and MFPs by the Danish national guideline; and (4) incidence of live-born children small for gestational age (SGA) or with fetal growth restriction (FGR), defined as *z* scores below −2 and −3, respectively. Stillbirth was defined as loss of the whole pregnancy from 24 weeks of gestation. Single IUFD was defined as a spontaneous loss of 1 fetus in triplet pregnancies reduced to twin pregnancies (3-2 FR), DCDA twin pregnancies, or NR-T pregnancies, and double IUFD was defined as a spontaneous loss of 2 fetuses in NR-T pregnancies. The secondary outcome measures were the rates of preterm premature rupture of membranes (PPROM), preeclampsia (PE), placenta previa, and placental abruption.

Statistical analyses

Categorical variables were summarized by percentages with 95% confidence intervals (CIs), calculated using the Clopper-Pearson interval, based on the direct binomial distribution.[18] Continuous variables were reported as medians with interquartile range (IQR). Because of ethical policies from the Danish Clinical Quality Registry, outcome measures with a number below 3 can only be reported as a proportion or designated as "n<3". Singletons and DCDA twins were included to describe the results in the general population and were not considered control groups. We performed separate comparisons of TCTA triplet pregnancies reduced to singleton pregnancies (3-1 FR) with outcomes of the singleton pregnancy cohort and those reduced to twin pregnancies (3-2 FR) with DCDA twin pregnancy outcomes. In addition, both 3-1 and 3-2 FRs were compared with nonreduced TCTA triplet (NR-T) pregnancies. The Fisher exact test was used to compare the categorical variables, and the Wilcoxon rank-sum test was used for continuous variables. These nonparametric tests were selected to account for the low number of TCTA triplet pregnancies and the rare occurrence of some reported outcomes. Differences in proportions between the 2 groups, including 95% CIs, were

calculated using the 2-sample test for equality of proportions. The cumulative incidence of preterm delivery before 40 weeks of gestation was plotted against GA at delivery for study cohorts. All statistical analyses were performed using the statistical software RStudio for Mac.

Ethical consideration

The following authorities approved the study: (1) the regional data security management authority (approval number: P-2019-696); (2) the Danish clinical quality registry (Danish Clinical Quality Program [DFMD] − National Clinical Registries [RKKP] case number: FØTO-2019-11-12); and (3) the Danish Patient Safety Authority approved the permission to retrieve missing or supplemental data from the departments where the participants delivered (case number: 31-1521-26). According to Danish legislation, ethical approval is not necessary for register-based studies.

Results

Overall, 318 TCTA triplet pregnancies were identified from the DFMD between January 2008 and December 2018, of which 317 pregnancies (99.7%) met the inclusion criteria. Of note, 229 patients (72.2%) with triplet pregnancies underwent FR, of which 222 pregnancies (96.9%) were reduced to twin pregnancies (3-2 FR) and 7 pregnancies (3.1%) were reduced to singleton pregnancies (3-1 FR). In addition, 19,465 primary singleton pregnancies and 9563 primary dichorionic twin pregnancies met the inclusion criteria. Less than 3 TCTA triplet pregnancies (0.3%) were excluded because of termination of pregnancy (Figure 1).

Maternal characteristics and obstetrical history are summarized in Table 1. Women with TCTA triplet pregnancies were typically nulliparous, with ART conceptions, and less likely to be current smokers than those conceiving singleton or DCDA twin pregnancies. FRs were performed at a median GA of 11+6 weeks (IQR, 11+5 to 12+1), of which 218 FRs (95.2%) were performed in the first trimester of pregnancy (before 14+0 weeks of gestation) and 11 FRs (4.8%) were performed in the second trimester of pregnancy (from 14+0 weeks of gestation) with 18+6 weeks of gestation being the highest GA of any FR in triplet pregnancies. All 3-1 FRs were performed on specific indications, of which 5 FRs (71%) were maternal indications and <3 FRs (29%) were fetal indications and performed in the second trimester of pregnancy. A congenital disease was confirmed in 0.5% of 3-2 FRs, and the procedure was performed in the first trimester of pregnancy. All remaining 3-2 FRs (99.5%) were performed on the indication of higher-order multiple pregnancies and by the couples' decision. The procedures were performed by 20 different operators, ranging from 1 to 45 procedures per operator. Pregnancy outcomes are summarized in Table 2.

Triplets reduced to twins were delivered on average 16 days later than NR-Ts ($P<.01$) and 10 days earlier than dichorionic twins ($P<.01$). Triplets reduced to singletons were delivered on average 33 days later than NR-Ts ($P=.013$) and 12 days earlier than singletons ($P<.01$). Figure 2 illustrates the differences in cumulative incidence of delivery according to GA.

The lowest birthweight was seen in NR-T pregnancies and increased progressively through the 3-2 FR, 3-1 FR, DCDA, and singleton cohorts. The

TABLE 1
Baseline maternal characteristics

Characteristic	Singleton S	Twins DCDA	Triplets TCTA
Number of pregnancies	n=19,465	n=9563	n=317
Maternal age	30 (26−33)	32 (29−35)	31 (28−35)[a,b]
BMI	23 (20−26)	23 (21−27)	23 (21−28)
Nulliparity	43.9 (6397)	46.5 (2794)	56.2 (91)[a,b]
Conception			
Spontaneous	93.2 (17,589)	52.8 (4846)	19.2 (55)[a,b]
OI	0.7 (138)	4.6 (422)	14.7 (42)[a,b]
IUI	1.7 (326)	10.3 (942)	46.2 (132)[a,b]
IVF	4.3 (820)	32.4 (2974)	19.9 (57)[a,b]
Current smoker	9.4 (1786)	7.2 (660)	3.4 (8)[a,b]
Caucasian ethnicity	93.2 (17,506)	94.9 (8526)	97.4 (225)[a]

Continous variables are presented as median (interquartile range), and categorical variables are presented as percentage (number).

BMI, body mass index; *DCDA*, dichorionic diamniotic; *IUI*, intrauterine insemination; *IVF*, in vitro fertilization; *OI*, ovarian induction; *S*, singleton; *TCTA*, trichorionic triamniotic.

[a] Significantly ($P<.05$) different from singleton pregnancies; [b] Significantly ($P<.05$) different from dichorionic diamniotic twin pregnancies.

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TABLE 2
Pregnancy outcomes

	Singleton	Triplets (TCTA)			Twins
Variable	S	3-1 FR	NR-T	3-2 FR	DCDA
Number of pregnancies	n=19,465	n=7	n=88	n=222	n=9563
Number of expected children	n=19,465	n=7	n=264	n=444	n=19,126
Gestational age at delivery (d)	281 (273–287)	269 (256–276)[a,b]	236 (223–251)	252 (234–262)[b,c]	262 (248–266)
Adverse pregnancy outcome	0.9% (0.7%–1.0%)	14.3% (0.4%–57.9%)	28.4% (19.3%–39.0%)	9.0% (5.6%–13.6%)[b,c]	3.1% (2.7%–3.4%)
Miscarriage <24 wk	0.6% (0.5%–0.8%)	14.3% (0.4%–57.9%)[a,b]	1.1% (0.0%–6.2%)	6.8% (3.8%–10.9%)[b,c]	1.7% (1.5%–2.0%)
FR to miscarriage (d)	—	5 (5–5)	—	63 (55–76)	—
<2 wk after FR	—	14.3% (0.4%–57.9%)	—	0.5% (0.0%–2.5%)	—
<4 wk after FR	—	14.3% (0.4%–57.9%)	—	0.9% (0.1%–3.2%)	—
≥4 wk after FR	0.0% (0.0%–0.0%)	0.0% (0.0%–41.0%)	0.0% (0.0%–4.2%)	5.9% (3.2%–9.8%)	0.0% (0.0%–0.0%)
Stillbirth ≥24 wk	0.2% (0.2%–0.3%)	0.0% (0.0%–41.0%)	0.0% (0.0%–4.1%)	0.5% (0.0%–2.5%)	0.1% (0.0%–0.1%)
Single IUFD	—	—	18.2% (10.8%–27.8%)	1.8% (0.5%–4.5%)[b]	1.3% (1.1%–1.5%)
Double IUFD	—	—	9.1% (4.0%–17.1%)	—	—
1 live-born	99.1% (99.0%–99.3%)	85.7% (42.1%–99.6%)[b]	9.1% (4.0%–17.1%)	1.8% (0.5%–4.5%)[b]	1.3% (1.1%–1.5%)
2 live-born	—	—	18.2% (10.8%–27.8%)	91.0% (86.4%–94.4%)[b,c]	96.9% (96.6%–97.3%)
3 live-born	—	—	71.6% (61.0%–80.7%)	—	—
At least 1 live-born	99.1% (99.0%–99.3%)	85.7% (42.1%–99.6%)	98.9% (93.8%–100.0%)	92.8% (88.6%–95.8%)[b,c]	98.2% (97.9%–98.5%)
At least 2 live-born	—	—	89.8% (81.5%–95.2%)	91.0% (86.4%–94.4%)[c]	96.9% (96.6%–97.3%)
No live-born	0.9% (0.7%–1.0%)	14.3% (0.4%–57.9%)	1.1% (0.0%–6.2%)	7.2% (4.3%–11.4%)[b,c]	1.8% (1.5%–2.1%)
Preterm delivery					
Live-born <28 wk	0.2% (0.1%–0.3%)	0.0% (0.0%–45.9%)	8.7% (5.4%–13.2%)	5.7% (3.6%–8.4%)[c]	1.9% (1.7%–2.1%)
Live-born <32 wk	0.7% (0.6%–0.9%)	0.0% (0.0%–45.9%)	27.9% (22.2%–34.2%)	13.1% (9.9%–16.7%)[b,c]	7.3% (6.9%–7.7%)
Live-born <37 wk	4.9% (4.6%–5.2%)	16.7% (0.4%–64.1%)[b]	90.0% (85.3%–93.5%)	61.6% (56.7%–66.3%)[b,c]	39.1% (38.3%–39.8%)
Term delivery					
Live-born ≥37 wk	95.1% (94.8%–95.4%)	83.3% (35.9%–99.6%)[b]	10.0% (6.5%–14.7%)	38.4% (33.7%–43.3%)[b,c]	60.9% (60.2%–61.7%)
Registered birthweight of live-born	98.7% (98.5%–98.8%)	100.0% (54.1%–100.0%)	100.0% (98.4%–100.0%)	96.8% (94.6%–98.3%)[b,c]	99.7% (99.6%–99.8%)
Birthweight (g)	3530 (3190–3860)	3090 (2711–3154)[a,b]	1842 (1445–2214)	2344 (1910–2679)[b,c]	2600 (2218–2900)
Birthweight (*z* score)	−0.10 (−0.77 to 0.62)	−0.49 (−1.06 to −0.40)	−1.53 (−2.17 to −0.88)	−1.23 (−1.86 to −0.65)[b,c]	−1.05 (−1.70 to −0.41)
SGA (*z* score <−2)	3.3% (3.0%–3.5%)	16.7% (0.4%–64.1%)	30.1% (24.3%–36.5%)	21.6% (17.7%–26.0%)[b,c]	15.8% (15.3%–16.4%)

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(continued)

TABLE 2
Pregnancy outcomes *(continued)*

Variable	Singleton	Triplets (TCTA)			Twins
	S	3-1 FR	NR-T	3-2 FR	DCDA
Number of pregnancies	n=19,465	n=7	n=88	n=222	n=9563
Number of expected children	n=19,465	n=7	n=264	n=444	n=19,126
Birthweight (*z* score)	−2.39 (−2.82 to −2.16)	−2.14 (−2.14 to −2.14)	−2.52 (−3.00 to −2.27)	−2.56 (−2.92 to −2.19)	−2.42 (−2.83 to −2.19)
FGR (*z* score below −3)	0.6% (0.5%–0.8%)	0.0% (0.0%–45.9%)	7.4% (4.4%–11.6%)	4.3% (2.5%–6.8%)	3.0% (2.7%–3.2%)
Birthweight (*z* score)	−4.15 (−8.33 to −3.27)	—	−3.28 (−3.97 to −3.15)	−3.61 (−3.74 to −3.25)	−3.41 (−3.92 to −3.15)

Continous variables are presented as median (interquartile range), and categorical variables are presented as percentage (95% confidence interval).

DCDA, dichorionic diamniotic; *FGR*, fetal growth restriction; *3-1 FR*, fetal reduction from 3 to 1 fetus; *3-2 FR*, fetal reduction from 3 to 2 fetuses; *IUFD*, intrauterine fetal death; *NR-T*, nonreduced triplet; *S*, singleton; *SGA*, small for gestational age; *TCTA*, trichorionic triamniotic.

[a] Significantly ($P<.05$) different from singletons; [b] Significantly ($P<.05$) different from nonreduced TCTA triplet pregnancies; [c] Significantly ($P<.05$) different from DCDA twin pregnancies.

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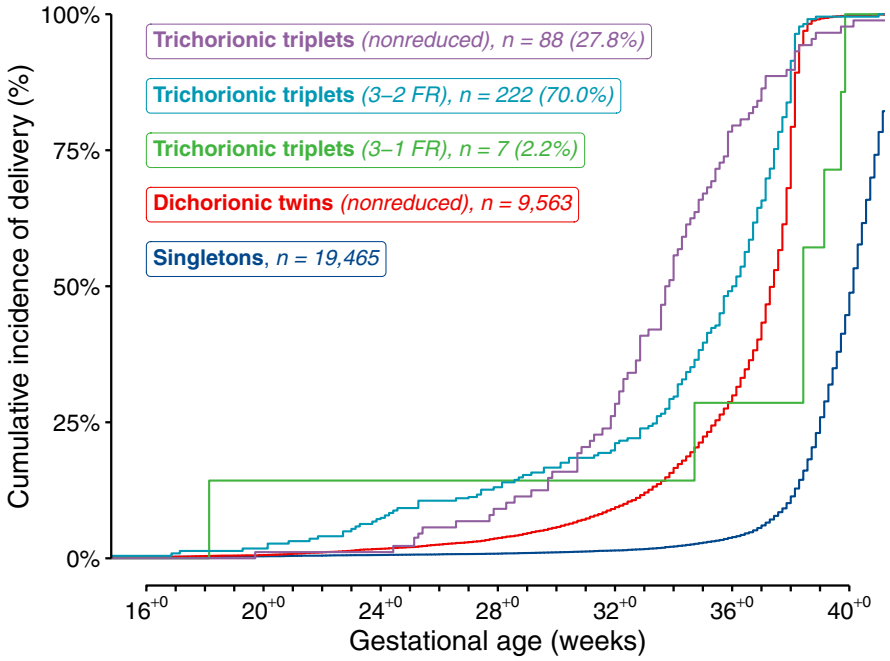
birthweight *z* scores were significantly higher in the 3-2 FR group than in the NR-T group ($P<.01$) but significantly lower than the DCDA group ($P<.01$). The rate of SGA (*z* score below −2) was significantly lower in the 3-2 FR group (21.6%) than in the NR-T group (30.1%; $P=.021$) but remained higher than the DCDA group (15.8%; $P<.01$). Triplets reduced to singletons had even lower rates of SGA (16.7%) but not significantly different from the NR-T group ($P=.7$) or the singleton group (3.3%; $P=.2$). The rate of FGR (*z* score below −3) was the highest among the NR-T group but did not differ significantly among groups.

Adverse pregnancy outcome was the highest among the NR-T group (28.4%), which was 3 times the risk seen in the 3-2 FR group (9.0%; $P<.01$), primarily because of a lower risk of single and double IUFD after 3-2 FR. The risk of miscarriage in the 3-2 FR group (6.8%) was significantly higher than in the NR-T group (1.1%; $P=.047$) and DCDA group (1.7%; $P<.01$). Triplet pregnancies reduced to singleton pregnancies had the highest risk of miscarriage (14.3%). The medians for the number of days from the FR procedure to miscarriage were 63 days for 3-2 FR and 5 days for 3-1 FR. The rates of miscarriage before 2 weeks after FR were 0.5% in 3-2 FR and 14.3% in 3-1 FR. The rates of miscarriage before 4 weeks after FR were 0.9% in 3-2 FR and remained 14.3% in 3-1 FR.

The chance of at least 2 live-born children did not differ between 3-2 FR (91.0%) and NR-T pregnancies (89.8%; $P=.8$) but was significantly lower for DCDA twin pregnancies (96.9%; $P<.01$). However, the chance of at least 1 live-born child was significantly lower in 3-2 FR (92.8%) than in NR-T (98.9%; $P=.049$) and DCDA (98.2%; $P<.01$) pregnancies. Triplet pregnancies reduced to singleton pregnancies had the lowest chance of at least 1 live-born child (85.7%), which, because of the small sample size, did not achieve significance compared with NR-T pregnancies (98.9%; $P=.14$) or singleton pregnancies (99.1%; $P=.059$).

Invasive diagnostic tests (IDT) were performed in 9.5% (30) of all TCTA

FIGURE 2
Cumulative incidence of delivery before 40 weeks of gestation



Pregnancies delivered at 40 weeks of gestation have been censored.

3-1 FR, fetal reduction from 3 to 1 fetus; *3-1 FR*, fetal reduction from 3 to 2 fetuses.

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triplets, of which 5.4% had chorionic villus sampling (CVS), 3.5% had amniocentesis (AC), and 0.6% had both CVS and AC. Triplet pregnancies reduced to singleton pregnancies (3-1 FR) had the highest rate of IDT (28.6%), followed by NR-T pregnancies (9.1%) and 3-2 FR (9.0%). Miscarriage was seen in 5.0% of 3-2 FR with IDT, compared with 6.9% of 3-2 FR without IDT. Among NR-T pregnancies, the rate of miscarriage was 0.0% with IDT, compared with 1.3% without IDT. The rate of adverse pregnancy outcomes in 3-2 FR with IDT was 10.0%, compared with 8.6% without IDT. In NR-T pregnancies with IDT, the adverse pregnancy outcomes were 50.0%, compared with adverse pregnancy outcomes of 23.9% in NR-T pregnancies without IDT. Among all TCTA triplet pregnancies, genetic anomalies were diagnosed by IDT in 3 pregnancies (1.0%), all undergoing subsequent FR and of which 33.3% miscarried before 24 weeks of gestation. All NR-T pregnancies having IDT had a normal karyotype. In addition, a normal karyotype was found in the 6 pregnancies (1.9%) with karyotype determination from abortion tissue, following an autopsy or postnatally.

The rate of PPROM was higher after 3-2 FR (18.5%) than in NR-T pregnancies (11.4%) but did not reach significance (P=.3). Similar proportional relationships without statistically significant differences were found for rates of placental abruption, PE, and placenta previa. Details of pregnancy complications are summarized in Table 3.

Comments

Principal findings

This Danish national evaluation identified TCTA triplet pregnancies in 1 per 2000 pregnancies viable at 11 to 14 weeks of gestation. Slightly more than 70% of Danish couples expecting TCTA triplets chose FR, of which 96.9% of triplet pregnancies were reduced to twin pregnancies.

GA at delivery and the risk of preterm deliveries were improved by FR but did not reach the equivalent figures for DCDA twin or singleton pregnancies. In addition, composite adverse pregnancy outcomes were improved significantly after FR, partly because of the high incidence of single or double IUFD among NR-T pregnancies. We found an increased risk of miscarriage in the 3-2 FR group, compared with the NR-T group.

Results in the context of what is known

There have been several publications regarding the risks and benefits of FR over the last 3 decades. Therefore, we extracted outcome measures to enable comparison with the results of the current study. Most studies are from single centers, with supplementation to previous results from the same institutions, but Evans et al[19] reported results from an international, multicenter FR study describing improvements in safety and perinatal outcomes, particularly related to increasing experience. Although the results of these studies were similar, there was a difference in what was reported, and methodological details regarding the inclusion and exclusion criteria and missing outcomes were only reported in 10 of 26 included studies. Therefore, the use of these data for counseling prospective parents and direct comparison of results is limited. Comparable studies and their extracted outcome measures are summarized in Supplemental Tables 1 and 2.

There is only 1 comparable nationwide study, from the Netherlands,[12] that included 130 TCTA triplet pregnancies (FR in 2/3) and 826 DCDA twin pregnancies. The results were concordant with the current study, confirming that FR is associated with a significant prolongation of pregnancy, higher birthweights, and decreased risk of preterm delivery compared with NR-T pregnancies. The current study identifies a similar procedural miscarriage risk but a markedly lower risk of preterm delivery before 32 weeks of gestation.

Among the included studies of FR in TCTA triplet pregnancies, miscarriage is the only consistently reported outcome

TABLE 3
Pregnancy complications

Variable	Singleton		Triplets (trichorionic triamniotic)						Twins	
	S		3-1 FR		NR-T		3-2 FR		DCDA	
Number of pregnancies	n=19,465		n=7		n=88		n=222		n=9563	
PPROM	1.6%	(1.4%–1.8%)	0.0%	(0.0%–41.0%)	11.4%	(5.6%–19.9%)	18.5%	(13.6%–24.2%)[a]	10.4%	(9.8%–11.1%)
Preeclampsia	3.2%	(3.0%–3.5%)	0.0%	(0.0%–41.0%)	13.6%	(7.2%–22.6%)	15.3%	(10.8%–20.7%)[a]	10.1%	(9.5%–10.8%)
Placenta previa	0.9%	(0.7%–1.0%)	0.0%	(0.0%–41.0%)	0.0%	(0.0%–4.1%)	0.5%	(0.0%–2.5%)	1.1%	(0.9%–1.4%)
Placental abruption	0.3%	(0.2%–0.4%)	0.0%	(0.0%–41.0%)	1.1%	(0.0%–6.2%)	1.4%	(0.3%–3.9%)	1.0%	(0.9%–1.3%)

Data are presented as percentage (95% confidence interval).

DCDA, dichorionic diamniotic; *3-1 FR*, Fetal reduction from 3 to 1 fetus; *3-2 FR*, fetal reduction from 3 to 2 fetuses; *NR-T*, nonreduced triplet; *PPROM*, Preterm premature rupture of membranes; *S*, singleton.

[a] Significantly ($P<.05$) different from DCDA twins.

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measure, with a mean rate of 5.6% (range, 1.3%–12.3%) for 3-2 FR and 9.4% (range, 2.9%–25.0%) for NR-T pregnancies. The mean rates of IUFD were 2.9% (range, 0.7%–7.1%) in 3-2 FR and 1.1% (range, 0.0%–3.4%) in NR-T pregnancies, but IUFD was not reported in all the included studies, and the definition of IUFD was not always clear. The mean rates of preterm delivery before 28 weeks of gestation were 3.1% (range, 1.1%–6.5%) in 3-2 FR and 7.5% (range, 7.5%–7.5%) in NR-T pregnancies. In addition, the mean rates of preterm delivery before 32 weeks of gestation were 14.6% (range, 6.4%–33.3%) in 3-2 FR and 8.6% in NR-T pregnancies. However, all summaries for preterm deliveries are limited by the few studies with well-defined chorionicity and inclusion of NR-T pregnancies (Supplemental Tables 1 and 2).

Overall, the adverse pregnancy outcomes reported in our study after FR are similar to or improved compared with previous publications, including reports of NR-T pregnancies. Although FR to twins entails a clear improvement in perinatal outcomes compared with NR-Ts, both studies indicate poorer outcomes when FRs are compared with DCDA twin pregnancies.

A striking finding in the current study is the low miscarriage incidence in NR-T pregnancies, which we believe is due to the relatively small sample size, and therefore, no substantial conclusion can be drawn concerning the early losses.

Clinical implications

Carrying a pregnancy with more than 1 fetus increases the risk of almost all known complications during pregnancy and labor.[1–5,39–41] In addition, neonatal morbidity and mortality are increased along with the risk of maternal complications.[42,43] Despite a normal assessment at the 11- to 14-week scan with 3 viable fetuses, TCTA triplet pregnancies are associated with a high risk of single or double IUFD, preterm delivery, and low birthweights.

Counseling couples about risks and possible interventions in a TCTA triplet pregnancy is complex because of

personal, religious, and legal factors.[44,45] This requires skilled staff who can present trustworthy data in a comprehensible and nondirective manner. Results from this large national study provide parents with clear information on the balance of risks and benefits of TCTA triplet pregnancies with or without FR. This procedure is associated with a significant prolongation of pregnancy, decreased risk of preterm delivery before 32 weeks of gestation, higher birthweights, and an unchanged chance of at least 2 live-born babies, despite an increased risk of miscarriage before 24 weeks of gestation.

The improved perinatal outcomes identified in this study may be attributable to the experience of the operator in a small number of fetal medicine units, following an evidence-based national protocol. Moreover, we speculate whether the obligatory use of a needle guide in Denmark is one of the reasons for the low incidence of PPROM among reduced triplet pregnancies in our study.

The inclusion of comparative outcomes for primary singleton and dichorionic twin pregnancies did not act as controls. However, we believe that the inclusion of comparative outcomes will assist the couples and clinicians in comprehending the balance of risks of FR concerning the Danish background population. An MFP undergoing FR will always remain different from a primary singleton or dichorionic twin pregnancy, but for comparison, they serve as an adequate surrogate as randomized controlled trials are ethically impossible.

Strengths and limitations

The major strength of our study is the national register-based design, an 11-year evaluation of all trichorionic triplet pregnancies with complete outcome information among reduced triplet pregnancies and NR-T pregnancies. During the study period, the participation rate exceeded 95% of pregnant women attending the public prenatal screening program, including the 11- to 14-week scan. All FR procedures were performed according to the same national protocol, and all triplet pregnancies were managed according to the same national guideline. Thus, the risk of selection bias is low. Moreover, the proportion of missing outcome data in both groups was low.

This study is a register-based retrospective single cohort study of prospectively collected data, which involves the risk of bias because of incorrect or incomplete data registration. However, the standard of the Danish registries is high, reflected by the detail of the analyzed data and the rate and transparency of missing outcome data.

The low rate and number of triplet pregnancies affected the certainty of some of our results, especially for 3-1 FRs, which is only possible to improve by a reevaluation in the future. Our results did not include adjustments for maternal factors, as singleton and DCDA twins were not considered control groups.

A limitation of the current study, along with previous studies, is the absence of longer-term neonatal outcome information, given that neurodevelopmental impairment and many congenital and acquired disorders become evident long after the perinatal period.

Conclusions

Our nationwide study of trichorionic triplets showed that 7 of 10 couples in Denmark choose to have FR. FR is associated with a prolongation of the pregnancy and an increased birthweight of the live-born children, in combination with decreased risks of preterm delivery and IUFD compared with NR-T pregnancies. The chance of at least 2 live-born children was equal in triplet pregnancies reduced to twins compared with NR-T pregnancies. The risk of miscarriage in triplet reduced to twins was low in absolute terms but insufficiently powered to prove different from NR-T pregnancies. ■

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The pregnancy outcome dataset analyzed in this study is available upon application to the Danish Fetal Medicine Database. Access to this database is overseen by the Danish Clinical Quality Program — National Clinical Registries, which controls the use of the data to ensure patient confidentiality and appropriate use of the data. Information on the data application process and criteria can be found at https://www.rkkp.dk/forskning/ (in Danish).

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SUPPLEMENTAL TABLE 1
Literature review of fetal reduction in triplet pregnancies with extracted outcomes

Author	Year	Chorionicity	Type of FR		Miscarriage <24 wk	IUFD ≥24 wk	Preterm delivery <28 wk	Preterm delivery <32 wk	Preterm delivery <37 wk	GA at delivery	Birthweight Grams	Birthweight <10th percentile	Birthweight <3rd percentile	Neonatal mortality	Missing outcome
Berkowitzet al[20]	1993	Mixed	FR	88	8.0 (7/88)	—	0 (0/81)	4.9 (4/81)	39.5 (32/81)	36.1	—	—	—	—	0 (0/88)
Evans et al[21]	1999	TCTA	sFR	39	12.8 (5/39)	—	11.8 (4/34)	20.6 (7/34)	23.5 (8/34)	—	—	—	—	—	—
Yaron et al[22]	1999	Mixed	3-2	143	6.3 (9/143)	—	5.2 (7/134)	—	—	35.6 ±3.1	2381 ±602	—	—	—	—
			NR	12	25.0 (3/12)	—	33.3 (3/9)	—	—	32.9 ±4.7	1636 ±645	—	—	—	—
		DCDA	NR	605	6.6 (40/605)	—	9.0 (51/565)	—	—	34.4 ±3.6	2123 ±634	—	—	—	—
Boulot et al[23]	2000	TCTA	3-2	65	3.1 (2/65)	5.7 (7/123)[b]	3.2 (2/63)	14.3 (9/63)	60.3 (38/63)	36 ±2.9	2362 ±554	39.7 (46/116)	9.5 (11/116)	0.9 (1/116)	—
			NR	83	6.0 (5/83)	4.7 (11/234)	6.4 (5/78)	33.3 (26/78)	97.4 (76/78)	33.5 ±2.8	1791 ±489	55.2 (123/223)	18.4 (41/223)	1.8 (4/223)	—
Evans et al[19]	2001	Mixed	FR	1749	6.1 (107/1749)	0.4 (7/1749)	3.4 (56/1635)	10.8 (177/1635)	41.1 (672/1635)	35.8	—	—	—	—	—
Lipitz et al[24]	2001	TCTA	3-2	46[c]	4.3 (2/46)	1.1 (1/86)	2.3 (1/43)[e]	9.3 (4/43)	55.8 (24/43)	35.8 ±3.0	2110 ±580	—	—	1.2 (1/85)	—
			3-2	49[d]	4.1 (2/49)	—	0 [e]	8.5 (4/47)	57.4 (27/47)	35.7 ±3.5	2140 ±490	—	—	1.1 (1/94)	—
Stone et al[25]	2002	Mixed	FR	549	5.3 (29/549)	1.0 (5/520)	3.1 (16/515)	10.9 (56/515)	40.6 (209/515)[f]	35.8	—	—	—	—	—
Antsaklis et al[26]	2004	TCTA	3-2	185	8.1 (15/185)	1.2 (4/340)	6.5 (11/170)	10.0 (19/190)	40.6 (69/170)[g]	36 ±3.2[h]	2300 ±467	11.0 (37/336)[i]	5.6 (19/337)[j]	5.4 (18/336)	—
			NR	70	2.9 (2/70)	0.5 (1/202)	10.3 (7/68)	36.8 (25/68)	83.8 (57/68)[g]	33 ±3.3[h]	1760 ±480	29.9 (60/201)[i]	7.0 (14/201)[j]	0.5 (1/201)	—
Geipel et al[27]	2004	TCTA	3-2	54	1.9 (1/54)	—	1.9 (1/53)[k]	—	—	35.0 ±3.0	2217 ±616	—	9.4 (10/106)	—	2.8 (3/108)
			NR	38	13.2 (5/38)	10.0 (1/99)	21.2 (7/33)[k]	—	—	30.6 ±3.2	1493 ±537	—	12.2 (12/98)	7.1 (7/98)	
		Mixed	spFR	13	7.7 (1/13)	0 (0/23)	8.3 (1/12)[k]	—	—	35.2 ±5.3	2160 ±801	—	13.0 (3/23)	—	
Stone et al[28]	2008	Mixed	3-2	512	4.5	—	—	—	—	—	2290	—	—	—	15.9 (159/1000)
			3-1		6.1										
Kuhn-Beck et al[29]	2012	TCTA	3-2	136	5.1 (7/136)	1.2 (3/258)	2.3 (3/128)	12.5 (16/128)	53.1 (68/128)	—	—	45.0 (112/249)	12.4 (31/249)	1.9 (5/258)	—
			3-1	44	9.1 (4/44)	0 (0/40)	7.5 (3/40)	10.0 (4/40)	27.5 (11/40)	—	—	27.0 (10/37)	10.8 (4/37)	5.0 (2/40)	—
Hershko-Klement et al[30]	2013	TCTA	3-2	70	4.3 (3/70)	—	3.0 (2/67)	7.5 (5/67)	—	35.8	—	—	—	—	2.2 (10/464)
		DCDA	NR	394	8.6 (34/394)	—	3.6 (13/360)	13.6 (49/360)	—	35.6	—	—	—	—	
Chaveeva et al[31]	2013	TCTA	3-2	265	7.9 (21/265)	0.4 (1/244)	—	14.8 (36/243)[l]	—	36.0 [h]	—	—	—	—	—
			3-1	34	14.7 (5/34)	3.4 (1/29)	—	7.1 (2/28)[l]	—	38.0 [h]	—	—	—	—	—
			NR	229	3.9 (9/229)	1.4 (3/220)	—	35.0 (76/217)[l]	—	34.0 [h]	—	—	—	—	—

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(continued)

SUPPLEMENTAL TABLE 1
Literature review of fetal reduction in triplet pregnancies with extracted outcomes *(continued)*

Author	Year	Chorionicity	Type of FR		Miscarriage <24 wk	IUFD ≥24 wk	Preterm delivery <28 wk	Preterm delivery <32 wk	Preterm delivery <37 wk	GA at delivery	Birthweight Grams	Birthweight <10th percentile	Birthweight <3rd percentile	Neonatal mortality	Missing outcome
Okyay et al[32]	2014	TCTA	3-2	43	7.0 (3/43)	1.2 (1/82)	2.4 (1/41)	31.7 (13/41)	56.1 (23/41)	34.5 ±4.4	2224 ±718	28.4 (23/81)[i]	11.1 (9/81)[i]	7.4 (6/81)	20.3 (35/172)
			spFR	29	6.9 (2/29)	0 (0/54)	7.4 (2/27)	77.8 (21/27)	92.6 (25/27)	31.8 ±4.7	1797 ±734	53.7 (29/54)[i]	16.7 (9/54)[i]	13.0 (7/54)	
			NR	65	9.2 (6/65)	7.3 (13/177)	11.9 (7/59)	88.1 (52/59)	100 (59/59)	31.0 ±5.0	1618 ±496	61.0 (100/164)[i]	27.4 (45/164)[i]	12.8 (21/164)	
		DCDA	NR	233	3.9 (9/233)	2.7 (12/448)	4.9 (11/224)	29.9 (67/224)	72.8 (163/224)	35.2 ±4.2	2329 ±596	20.4 (89/436)[i]	7.6 (33/436)[i]	7.3 (32/436)	42.2 (170/403)
Shiva et al[33]	2014	TCTA	3-2	57	12.3 (7/57)	6.0 (6/100)	2.0 (1/50)	12.0 (6/50)	48.0 (24/50)[f]	35.1 ±2.6	2188 ±547	11.7 (11/94)[i]	—	—	—
			NR	58	12.1 (7/58)	17.6 (27/153)	13.7 (7/51)	31.4 (16/51)	76.5 (39/51)[f]	32.4 ±3.6	1674 ±546	34.9 (44/126)[i]	—	—	—
van de Mheen et al[12]	2014	TCTA	3-2	86	5.8 (5/86)	4.3 (7/162)	—	22.2 (18/81)	—	36.1 (33.3–37.5)[n]	2217 ±768	—	—	—	2.3 (2/88)
			NR	44	11.4 (5/44)	2.6 (3/117)	—	38.5 (15/39)	—	33.3 (28.1–35.2)[n]	1700 ±607	—	—	—	—
		DCDA	NR	824	3.5 (29/824)	1.8 (28/1590)	—	11.7 (93/795)	—	37.1 (35.3–38.1)[n]	2422 ±669	—	—	—	—
Drugan and Weissman[4]	2017	Mixed	3-2	105	2.9 (3/105)	—	—	2.9 (3/102)	—	35.4 ±2.4	2222 ±485	—	—	—	—
			3-1	35	2.9 (1/35)	—	—	0 (0/34)	—	37.7 ±2.1	3018 ±609	—	—	—	—
Abdelhafez et al[34]	2018	TCTA	3-2	53	7.5 (4/53)	7.1 (7/98)	6.1 (3/49)	24.5 (12/49)	—	33.5 ±2.8	—	19.8 (18/91)[i]	—	18.7 (17/91)	—
Yılanlıoglu et al[35]	2018	Mixed	3-2	132	6.6 (10/151)	3.4 (9/264)	—	9.2 (13/141)	—	35.2 ±2.4	2270 ±488	—	—	2.7 (7/255)	0.7 (1/152)
			3-1	19						37.0 ±3.1	2726 ±774	—	—		
Liu et al[36]	2019	TCTA	3-2	610	4.9 (30/610)0	2.5 (29/1160)	—	—	52.7 (304/577)	36.2 ±2.3	2433 ±494	—	—	1.3 (15/1131)	—
			3-1	22	4.5 (1/22)[o]	0 (0/21)	—	—	14.3 (3/21)	38.2 ±2.0	3129 ±518	—	—	0 (0/21)	—
			NR	40	15.0 (6/40)[o]	5.9 (6/102)	—	—	85.3 (29/34)	34.6 ±2.2	2084 ±600	—	—	1.0 (1/96)	—
Zemet et al[37]	2020	TCTA	3-2	223	1.3 (3/223)	0.5 (1/220)	—	9.6 (21/218)	56.9 (124/218)	36 (34–38)[n]	2165 (1790–2520)[n]	15.4 (67/436)	—	1.1 (5/436)	—
		Mixed	3-1	62	4.8 (3/62)	0 (0/59)	—	0 (0/59)	13.6 (8/59)	39 (37–40)[n]	2887 (2501–3366)[n]	13.6 (8/59)	—	0 (0/59)	—

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(continued)

SUPPLEMENTAL TABLE 1
Literature review of fetal reduction in triplet pregnancies with extracted outcomes *(continued)*

Author	Year	Chorionicity	Type of FR		Miscarriage <24 wk	IUFD ≥24 wk	Preterm delivery <28 wk	Preterm delivery <32 wk	Preterm delivery <37 wk	GA at delivery	Birthweight Grams	Birthweight <10th percentile	Birthweight <3rd percentile	Neonatal mortality	Missing outcome
Balci et al[38]	2022	TCTA	3-2	106	5.7 (6/106)	3.5 (7/202)	1.0 (1/101)	12.9 (13/101)	70.3 (71/101)	—	—	—	—	—	6.2 (10/161)
			NR	45	13.3 (6/45)	3.4 (4/117)	12.8 (5/39)	41.0 (16/39)	100 (39/39)	—	—	—	—	—	
Yimin et al[5]	2022	Mixed	3-2	331	6.6 (22/331)	7.4 (46/618)	—	5.5 (17/309)	48.5 (150/309)	37.0 (35.7–37.9)[n]	2500 (2200–2800)[n]	—	—	—	—
			3-1	45	6.7 (3/45)	0 (0/42)	—	2.4 (1/42)	14.3 (6/42)	39.1 (38.3–40.0)[n]	3050 (2775–3300)[n]	—	—	—	—
		DCDA	NR	2788	6.5 (182/2788)	7.5 (392/5212)	—	4.8 (126/2606)	47.6 (1240/2606)	37.0 (35.7–38.0)[n]	2550 (2225–2850)[n]	—	—	—	—
		Singletons	S	6853	5.4 (371/6853)	0.5 (32/6482)	—	1.0 (65/6482)	7.7 (500/6482)	39.0 (38.0–40.0)[n]	3340 (3038–3650)[n]	—	—	—	—

Data are presented as Percentage (fraction) or mean±standard deviation.

DCDA, dichorionic diamniotic; *FR*, fetal reduction; *3-1*, fetal reduction from 3 to 1 fetus; *3-2*, fetal reduction from 3 to 2 fetuses; *GA*, gestational age; *NR*, nonreduced; *S*, singleton; *sFR*, selective fetal reduction; *spFR*, spontaneous fetal reduction; *TCTA*, trichorionic triamniotic.

[a]Unclear result, mixed with other multifetal pregnancies; [b] Of note, 3 additional fetuses were lost at <24 weeks of gestation, without loss of the remaining fetus; [c] FR at 11 to 12 weeks of gestation; [d] FR at 13 to 14 weeks of gestation; [e] Preterm delivery before 26 weeks of gestation; [f] Preterm delivery before 36 weeks of gestation; [g] Preterm delivery before 35 weeks of gestation; [h] Median; [i] Birthweight of <1500 g; [j] Birthweight of <1000g; [k] Preterm delivery before 29 weeks of gestation; [l] Preterm delivery before 33 weeks of gestation; [m] Median (range) and excluding pregnancies with delivery before 24 weeks of gestation; [n] Median (interquartile range); [o] Defined as delivery before 28 weeks of gestation or birthweight of <1000 g.

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SUPPLEMENTAL TABLE 2
Summary of the results of Supplemental Table 1

Authors	Chorionicity	Type of FR (n)		Miscarriage <24 wk		IUFD ≥24 wk		Preterm delivery <28 wk		<32 wk		<37 wk		GA at delivery		Birthweight Grams		<10th percentile		<3rd percentile		Relevant studies
Summary	TCTA[a]	3-2 FR	2048	5.6	(111/2048)	2.9	(74/3075)	3.1	(26/765)	14.6	(176/1321)	55.1	(772/1438)	35.5	±3.1	2236	±580	31.0	(218/782)	9.6	(80/889)	12,23,24,26,27,29–31,33,34,36–38
		3-1 FR	100	9.4	(10/100)	1.1	(1/90)	7.5	(3/40)	8.6	(6/68)	20.9	(14/61)	38.1	±2.0	3129		27.0	(10/37)	10.8	(4/37)	29,31,36
		NR	672	9.7	(51/672)	4.9	(69/1421)	12.7	(38/328)	43.4	(226/551)	90.5	(299/329)	32.8	±3.7	1731	±503	45.2	(327/714)	16.3	(112/686)	12,23,26,27,31–33,36,38
	Mixed[b]	3-2 FR	711	5.3	(34/579)	7.4	(46/618)	5.2	(7/134)	4.2	(20/411)	48.5	(150/309)	35.8	±2.6	2343		—		—		4,5,22,35
		3-1 FR	161	4.8	(7/142)	0.0	(0/101)	—		0.8	(1/135)	13.9	(14/101)	38.2	±2.6	2920		—		—		4,5,35,37
		NR	12	25.0	(3/12)	—		33.3	(3/9)	—		—		32.9	±4.7	1636		—		—		22

Data are presented as mean percentage (fraction) or mean±standard deviation.

3-1 FR, fetal reduction from 3 to 1 fetus; *3-2 FR*, fetal reduction from 3 to 2 fetus; *GA*, gestational age; *NR*, nonreduced; *TCTA*, trichorionic triamniotic triplet.

[a] Studies with clear definition of chorionicities. For each outcome, only studies with sufficient details were evaluated; [b] Either no detail of chorionicities or specified as a mix of TCTA and dichorionic triamniotic: 3-1 FR or 3-2 FR.

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